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AUTHOR Jones, William D.; McIntyre, Lesley
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ABSTRACT

The Matching Family Figures Test (MFF) is examined in order to show that a wide variety of rational speed-accuracy trade-offs ranging from impulsive to reflective are quite plausible. Ten children (mean age, eight years) took part in the experiment. Five had previously been classified on the basis of the MFF as impulsive, five as reflective. On the recognition memory task, the two groups did not differ in accuracy but did differ reliably in response bias. The groups also differed in mean latency. Thus, it was found that the MFF can predict differences in latency on other tasks, but such differences may not be associated with perceptual sensitivity so much as with response bias. The results are seen as indicative of lack of reason for the usual preference for the reflective strategy. (SJL)

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On the limits of Kagan's Impulsive-Reflective Distinction.

Paper presented at the
AERA Annual Meeting
San Francisco, 1976

by

William D. Jones

and

Lesley McIntyre

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Kagan and his associates have suggested that children can adopt one of two distinctive cognitive styles, impulsive or reflective (e.g. Kagan, 1966 a, b; Kagan et al, 1964). He makes uses of the so-called matching familiar figures test (MFF) in which the child is required to choose the correct match for a line drawing from a 2 x 3 matrix of alternatives only one of which is correct. If the child is in error he is allowed to make a further choice until he is eventually correct. In terms of the MFF impulsive children make more errors though the latency of their first choice is shorter, "reflective" children make fewer errors though taking longer to make their first choice. It is important to notice that Kagan argues for the general value of the impulsive-reflective distinction i.e. children can be assessed one way or the other on a variety of tasks.

There is no doubt that the reflective strategy is taken to be the better of the two. For example Kagan et al. (1964) have suggested that impulsivity may result from brain-damage; training programs are intended to make the impulsive child reflective not the other way round (e.g. Egland, 1974). In short the rationality of the "impulsive" childs' strategy is denied.

Our purpose here is to examine the psychophysical structure of the MFF to show that a wide variety of rational speed-accuracy trade-offs ranging from impulsive to reflective are quite plausible. We suggest in fact that the MFF may tell us little about perceptual sensitivity or discriminative abilities. We make four main points:

(i) Because the child is explicitly allowed to make as many

choices as he may need he can "play the game" without discriminating any alternatives i.e. he can simply eliminate one alternative after another in a very short time. He sees the task as one of obtaining positive feedback very quickly.

(ii) The MFF does not separate factors of sensitivity and response bias which are confounded in the error score. A number of psychophysical theories including signal detection theory and choice theory have shown how error rates do not of themselves indicate perceptual sensitivity.

(iii) The practice of reporting <u>total</u> error scores over typically 12 or 24 MFF items may have exaggerated differences between children. As an example take Egland's data. He trained impulsive children to be reflective. Before training on 8 MFF items they made 19.0 errors and 48.6 seconds total time for their first choices. After training they made 10.4 errors in 125.6 seconds. In other words the child was now taking about 10 sec. longer to make his first choice which enabled him to be right the first time instead of the second time. Certainly the child's performance had changed; it had not obviously improved.

We used a running memory span task in which the child had to say whether a line drawing he was now seeing had previously appeared ("Old") or was appearing for the first time ("New"). This task prevents the child from adopting a variety of game plans since he can make only one response choice. However, both accuracy and latency can vary so the task is one which should call forth impulsive or reflective

strategies. Moreover, the task lends itself to a separate analysis of recognition memory accuracy and of response bias which we achieved using the choice-theory parameters η (accuracy) and b (response-bias) (Luce, 1963).

10 children (mean age, 8 years 0 months) took part in the experiment. 5 had previously been classified on the basis of the MFF as impulsive, 5 as reflective.

For the recognition memory task we calculated a range of parameters, η, b, the mean response latency and latency variance. It is clear from the table that the two groups do not differ in accuracy (t (8) = .27) but do differ reliably in bias (t (8) = 2.44, $p < .025$). The reflective children were somewhat biased to say "Old", the reflective group being rather more biased to say "New."

The groups also differ in mean latency (t (8) = 1.93, $p < .05$). Interestingly when we break down latencies for correct and incorrect responding, correct responses were the quicker for 8 out of the 10 subjects. In terms of the MFF it is conceivable that there should be some children who make more errors in a shorter time compared to others who make fewer errors in a longer time, though for each child individually his correct responses would be faster than his errors. Our notion of impulsivity-reflectivity would have to be considerably more complex if this were the case.

In sum we have shown that the MFF can predict differences in latency on other tasks. But such latency differences may not be associated with perceptual sensitivity so much as with response bias. If this

is the case there is no good reason to prefer the reflective strategy to the impulsive one and no good reason for expensive training programs designed to change the childs strategy.

TABLE I

Means and standard deviations for recognition, accuracy (η) and response bias (b) for each subject group.

	Impulsive		Reflective	
	Mean	SD	Mean	SD
η	.114	.13	.140	.14
b	2.720	1.54	.820	.37*

* t (8) = 2.44, $p < .025$

TABLE II

Means and standard deviations in seconds for average latencies (L), average latency of correct responding (LCR) and average latency of errors for both groups (LERR).

	Impulsive		Reflective	
	Mean	SD	Mean	SD
L	1.51	.51	2.36	.71*
LCR	1.39	.41	1.51	1.01
LERR	2.40	1.32	2.76	.86

* t (8) = 1.93, $p < .05$